(Copyright, 1899, by the New York Journal and Advertiser.)

THE PICKET DUTY PUZZLE THAT MYSTIFIED THE ARMY.

BY SAM LOYD.

A Military Problem for Soldiers and Civilians.

HERE is a problem in military tactics which, despite its apparent simplicity, does not yield readily to mathematics or the experimental methods of puzzledom. It pertains to a class of puzzles which may baffle a scientist for weeks at a time, but which some clever lad is liable to guess in five minutes. Take a pencil and paper, and with a liberal allowance of patience figure it out for yourself.

In order to familiarize his men with the entire country surrounding his camp, and, as well for the mutual protection of the men who were doing picket duty in an exceptionally dangerous locality, a commanding general ordered that the pickets should be sent out during the night in squads of three men together. It was also decided that the camp should be guarded from not less than five different directions, which would require five squads of three men each, every night, making in all fifteen men always on picket duty at the one time. The same points do not have to be picketed every night, but as fifteen men are sent out, it is obvious that at least five places are guarded, a point of the problem being to restrict the number of locations, it is clear that one of the objects is to so arrange or manipulate the placing of the squads so that as many men as possible will visit each spot without being compelled to go there a second time, or to serve in the same squad with a previous comrade. In other words, what is the fewest number of localities which could possibly be picketed by five squads in seven days.

These same men were to do picket duty for seven days consecutively, but no man was to visit the same locality twice, nor were any two men to go out together more than once. By these means the men became well acquainted with their comrades, as it will be found that every man had to do picket duty one night with every other man, but each man also became well acquainted with the several points to be picketed.

It is important to discover the minimum number of localities which can be picketed under the conditions mentioned. Of course, the locations may be changed or omitted at pleasure, but the five squads must be sent out simultaneously every night.

In giving the answer the men may be designated by letters and grouped into squads as follows: First night—A, B and C; D, E and F; G, H and I; J, K and L; M, N and O, who visit locations 1, 2, 3, 4 and 5 in the order named.

Five dollars will be paid for the best answer received within two weeks. Address SAM LOYD, N. Y. Journal

CAN YOU SEND OUT THE FIVE SQUADS ON PICKET DUTY FOR SEVEN NIGHTS SO THAT NO TWO MEN MEET MORE THAN ONCE DURING THAT TIME NOR PICKET THE SAME LOCALITY AGAIN?

The Many Mysteries of th Numeral Nine.

ALMOST all of the "mysterious propert eral nine" which are exploited writers, as well as puzzlists, n point, which is well worth knowing, viz: quantity of figures, no matter how they are ar any number of columns, will always add up so duce a sum which by persistent adding of the numbers of the answers, will finally "boil dow figure, which in every instance will be the same. ample:

Arrange a haphazard selection of a hundred figures columns, and add them up.

```
98765432100123456789
66554433221199887766
35968421674983627093
20408766326577321872
58316754214628689450
--------------------
280013807537512982970—87—15—6.
```

If we then add together the twenty-one figures in answer we get 87; these two figures added together prc 15, which will be reduced by a further addition to 6.

Now, if the hundred figures are added together, t will produce the sum of 474; these three figures added gether produce 15, which will reduce by another additio 6. No matter how those hundred figures may be arran they will always produce a sum which repeated a tions will reduce to a residual root of 6.

It is evidently possible to tell whether a given c of figures can be arranged so as to produce a ce total, as, for instance, in a puzzle which I prop many years ago, known as

THE CENTENNIAL PROBLEM.

Arrange the figures 1 2 3 4 5 6 7 8 9 in such a way tha they will foot up by a single addition just 100.

The nine digits will foot up 45, and these two figu give a residual root of 9, and as 100 gives a residual o it is evident that the numbers must be arranged in som way to either gain or lose one point. How is it done?

The nine numbers may readily be arranged in columns which will add up 95, 54, 63, 72, 81, 99, 108, 117, 126 and any sum, the figures of which give a residual number 9, but it is impossible to arrange them so as to produce any su between these amounts, without resorting to the t upon which the Centennial Problem is constructed.

An Interesting Match Puzzle for the Children to Solve.

THE young folks are always partial to tricks to be performed with some such articles as strings, coins, buttons, pins, pencils, etc., and a real good puzzle with a happy faculty of showing it off to good advantage will create endless amusement for a children's party. Many clever tricks are done with matches, which at the first glance appear very paradoxical, but like the Columbus egg trick, become very simple when we are shown the secret.

The sketch shows Kitty puzzling her brother with fifteen matches, which she has arranged on the table in the form of three diagrams, as shown, accompanied by this startling proposition: "Now, Dick, here are fifteen sticks. Take away six and leave ten."

How does Kitty perform the trick?

TAKE AWAY SIX MATCHES AND LEAVE TEN.

I once made the acquaintance of a good fellow who described himself as "an unmitigated blockhead," but who had a repertoire of one little trick with two matches which was as amusing as it was difficult, although it's chief merit depended upon his ludicrous way of showing it. As he used to say, he was naturally stupid and awkward about such matters, but this one little trick had passed him right along through his entire life with the reputation of being a very clever fellow.

This match puzzle, with the practical lesson in potato digging, is given this week for the benefit of the young folks.

How Did They Hoe the Rows of Potatoes?

TWO brothers go out into a field to hoe potatoes, which are planted in rows of twenty-six hills to a row. The brothers intended to work different rows, beginning from opposite sides of the field; by mistake however, the younger brother hoed three hills of his brother's row before he discovered his error. When the brother discovered his mistake he went back and commenced anew, on the end of the other row. The other brother, however, finished out his row and commenced to help out his brother on his row, and hoed six hills before they met. The question is to determine just how many hills one brother hoed more than the other, and incidentally to mention whether it was the elder or the younger who did the most work. There is no catch or even mathematical difficulty connected with this problem. It is a common, every-day transaction which might be solved with a hoe in your own potato patch, and as a matter of fact did occur somewhat as stated, and resulted in a lively controversy as to which of the brothers did the most work. The entire family was brought into the dispute, and the opposing views were so evenly divided, that it is safe to say the potato patch in dispute would have gone to grass if the old folks had not wisely deemed it best to throw up a cent to determine which one of the brothers was right.

It takes a pretty clear head, however, to figure out problems of this nature without recourse to pencil and paper. It is given just to illustrate the value of puzzle practice, so it is hoped that our young friends will essay to work it mentally. Five dollars will be given for the best answers to the two simple problems received within two weeks. Address SAM LOYD, care of New York Journal.

Lewis Carroll's Monkey and Weight Problem.

HERE is a quaint little problem in mechanics which, despite its apparent simplicity, is said to have caused Lewis Carroll consederable disquietude.

Whether he was the originator of the problem or not is unknown, but in an evil hour, as set forth in a paper upon his writings and doings, he asked for information upon the following subject: "A rope passed over a loose pulley, on one end of which is suspended a ten-pound weight which balances exactly with a monkey eating an apple while complacently swinging on the other end. The proposition is as follows: 'Now, while the monkey and his apple balance with the ten-pound weight, what would be the result if the monkey, while eating the apple, should proceed to climb the rope?' 'It is very curious,' says Lewis Carroll, 'to note the different views taken by good mathematicians. Price says the weight goes up with increasing velocity. Clifton and Harcourt maintain that the weight goes up at the same rate of speed as the monkey, while Sampson says that it goes down.'" A distinguished mechanical engineer, to whom the problem was shown, says that the weight would rise or lower according to the inverse ratio of the speed with which the monkey ate the apple.

Of course, it is self-evident that, as shown, the two ends of the rope represent a perfect balance, which would be sensitive to the slightest change. Should either side, for example, be raised any distance whatever it would throw just so much rope over to the other side of the wheel, which would disturb the equilibrium and precipitate a fall on the other side, which would be accelerated by every foot, or additional weight of rope gained by the descent. In other words, any movement whatever, whether up or down, which produces a partial turn of the pulley wheel would create an immediate fall which could not be checked. The question, therefore, is to determine whether the weight will rise or fall, if the monkey should proceed to climb the rope, while disposing of the apple, and also to settle the main fact as to whether it is possible for that monkey to climb the rope, and if not, what will result from his persistent efforts.

According to established mechanical laws, a moveable pulley doubles the power or leverage, but one which is stationary, as in the present case does not affect the situation in the slightest.

IF THE MONKEY CLIMBS THE ROPE WILL THE WEIGHT GO UP OR DOWN?

HOW MANY ACRES IN THIS HALF-PLOUGHED FIELD?

SPEAKING about mathematical problems or complications which occasionally turn up in the rural districts, here is another one, somewhat out of the ordinary, which does require some little figuring. A boy who was ploughing a field was asked by a passer-by how many acres were in the field. The boy, who knew more about ploughing than measurements by acres, replied: "The field is a square one, and I have ploughed just one rod wide all around it, and I know that just one-half of the field is now finished."

It was simply stated, and yet it makes a pretty problem for those mathematically inclined. How many acres did the field contain?

ONE OF THE BROTHERS HOED THE WRONG ROW AND COMPLICATIONS AROSE. SEE IF YOU CAN STRAIGHTEN OUT THE PROBLEM THAT FOLLOWED.

The 15-14 Puzzle Answered by Three Careful Calculators.

ONCE more this famous old problem has had an inning which has been productive of a vast amount of worriment combined with amusement. Out of the thousand and one correspondents who claimed that they had solved the problem in days of yore, and who would agree to look up their old solutions or repeat the feat of mastering it, if any inducements were offered, a few hundred have been heard from. Some frankly admit their inability to produce the promised answers, but still maintain their faith in previous achievements.

A score or more, however, find that in going over their old records they discover, either false plays or transpositions in the final positions which had evidently been overlooked, so I can once more repeat the assertion that, despite the already mentioned fact of so many claiming to have done the puzzle and can do so again, no one has put in a claim for the $1,000 offered for a written solution. One interesting feature of the reproduction of the old puzzle, which has developed is that several old-timers who have posed in their immediate neighborhoods as the "only one who ever mastered the 15-14 puzzle," find that their reputations for astuteness have been irreparably punctured.

THREE PRIZE WINNERS HAVE SOLVED THIS.

The three other propositions, as presented, revived an interest in the old mystery and scores of answers of variable degrees of merit have been received from the present generation of puzzlists, who recognize the fascination which enthralled their grandparents.

The original problem which no one has yet mastered was to start from the position as again shown, and move the blocks so as to correct that unfortunate transposition of the 15 and 14. A prize of $5 was offered for the shortest method of bringing an answer, with the vacant square at the upper right hand corner. F. L. SAWYER, of No. 118 Ann street, Toronto, Canada, gives the best answer, as follows: 14, 11, 12, 14, 11, 15, 13, 9, 10, 12, 15, 13, 12, 10, 9, 12, 13, 15, 14, 11, 15, 14, 7, 8, 4, 3, 2, 6, 8, 4, 3, 2, 6, 1, 5, 8, 4, 6, 1, 4, 6, 7, 10, 9, 8, 5, 4, 1, 2, 3, 7, 6, 5 and 4.

The second problem was to start from original position, as s n in picture, and produce an arrangement in the fewest possible move vould be correct if the board were then given "a quarter turn" so as to the vacant squares to the right hand lower corner. A. B. KORNIG, 330 East Sixth street, New York, wins $5 with the following clever s of moves: 14, 15, 13, 9, 5, 1, 2, 3, 4, 8, 12, 11, 15, 13, 9, 5, 1, 2, 3, 4, 8, 12, 11, 15, 10 and 6.

The third problem really represented the idea of the puzzle as it was designed by the author when first issued. In the position as shown, the pieces are all in regular order, the transposition of the 15 and 14 being corrected. The problem is to move the pieces so as to produce a magic square in the fewest possible number of plays, so arranged that it will add up thirty in ten different directions. The prize of $5 is awarded to DR. A. SIDNEY REYNOLDS, of No. 1339 North Seventh street, Philadelphia, who has made quite a study of magic squares and its kindred problems. This last proposition gives scope for great ingenuity as it will be found to turn upon the feature of having some of the blocks in their original positions: 15, 14, 10, 6, 7, 3, 2, 7, 6, 11, 3, 2, 7, 6, 11, 10, 9, 3, 2, 11, 10, 9, 5, 1, 6, 10, 9, 5, 1, 6, 10, 9, 5, 2, 12, 15 and 3.

The moves as given lead to the magic square, as shown in Figure 1. Several clever solvers produced squares like Figure 2, which shows nineteen additions of thirty, but requires more moves.

Figure 1.

10,	9,	7,	4,
6,	5,	11,	8,
1,	2,	12,	15,
13,	14,	0,	3,

Figure 2.

14,	5,	8,	3,
9,	2,	15,	4,
7,	12,	1,	10,
0,	11,	6,	13,